



NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS  
Trig-Star Contest Test Cover Sheet - Local Contest

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**CONTESTANT INFORMATION (PLEASE PRINT)**

Name \_\_\_\_\_ Graduation Year \_\_\_\_\_  
High School \_\_\_\_\_ High School Address:  
Street: \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Home Address: \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone \_\_\_\_\_ Email \_\_\_\_\_  
Parent / Guardian Names \_\_\_\_\_  
Math/Trigonometry Teacher's Full Name \_\_\_\_\_  
Phone or Email \_\_\_\_\_  
Sponsor's Name or Company \_\_\_\_\_

**I HEREBY STATE THAT THE WORK PERFORMED ON THIS EXAM IS MY OWN WORK DONE WITHOUT THE AID OF COMPUTER / CALCULATOR SOFTWARE PROGRAMS.**

Signature \_\_\_\_\_ Date \_\_\_\_\_

*Check for information about careers in Surveying and Mapping and associated scholarships.*

**CONTEST RULES**

1. One (1) hour maximum for completion of the competition.
2. Place answers in the spaces provided - answers shown elsewhere will not count. Be sure to give answers in the format requested.
3. All competition materials will be collected when you are finished.
4. Raise both hands when you finish - your time will be noted to the nearest second.
5. After your competition paper is collected you may leave the room, unless instructed otherwise.
6. First place is awarded to the highest score. In the event of a tie score, the student that completed the competition first will win.

**PLEASE PLACE YOUR NAME ON THE FIRST PAGE OF THE TEST  
(THIS COVER PAGE WILL NOT BE RETURNED TO YOU)  
DO NOT BEGIN THE TEST UNTIL INSTRUCTED TO DO SO  
GOOD LUCK!**

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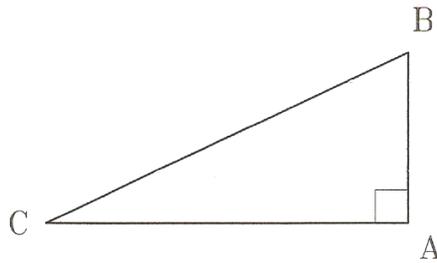
**FOR INSTRUCTORS USE**

Time \_\_\_\_\_ (nearest second) Point Total \_\_\_\_\_

**TRIG-STAR PROBLEM 1A LOCAL CONTEST**

**REQUIRED ANSWER FORMAT**  
 DISTANCES: NEAREST HUNDREDTH  
 ANGLES: DEGREES-MINUTES-SECONDS  
 (TO THE NEAREST SECOND)

PRINT NAME: \_\_\_\_\_

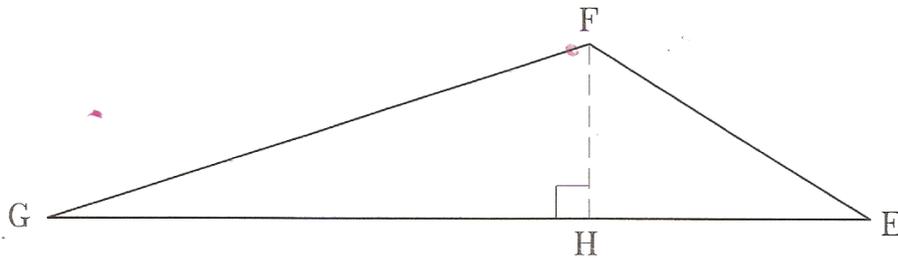


**KNOWN:**  $AB = 86.27$ ,  $BC = 158.16$

**FIND:** DISTANCE  $AC =$  \_\_\_\_\_ (5 Points)

$\angle ABC =$  \_\_\_\_\_ (5 Points)

**TRIG-STAR PROBLEM 1B LOCAL CONTEST**



**KNOWN:**  $EF = 62.25$ ,  $\angle EFG = 109^\circ-49'-58''$ ,  
 $\angle FEG = 47^\circ-39'-18''$

**FIND:** DISTANCE  $EH =$  \_\_\_\_\_ (6 Points)

DISTANCE  $FH =$  \_\_\_\_\_ (6 Points)

DISTANCE  $FG =$  \_\_\_\_\_ (6 Points)

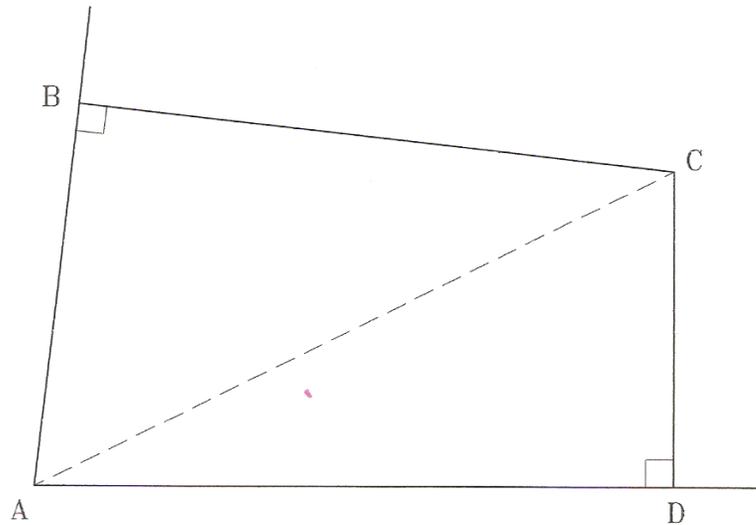
DISTANCE  $GH =$  \_\_\_\_\_ (6 Points)

$\angle EGF =$  \_\_\_\_\_ (6 Points)

Page Total: \_\_\_\_\_ Points

TRIG-STAR PROBLEM 2 LOCAL CONTEST

REQUIRED ANSWER FORMAT  
DISTANCES: NEAREST HUNDREDTH  
ANGLES: DEGREES-MINUTES-SECONDS  
(TO THE NEAREST SECOND)



KNOWN:

$$BC = 363.56, CD = 191.18, \\ \angle BAD = 76^{\circ}-47'-50''$$

FIND:

Distance AB = \_\_\_\_\_ (10 Points)

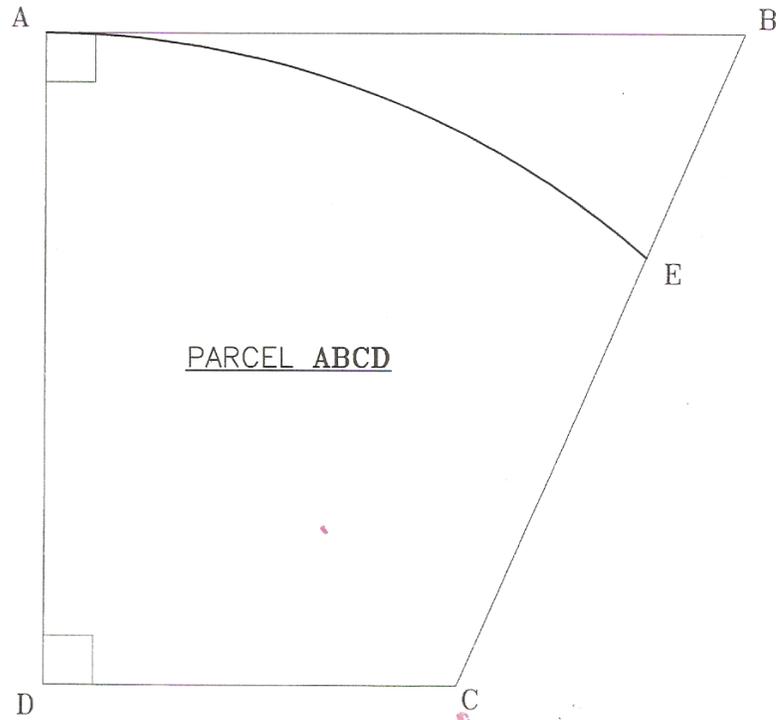
Distance AD = \_\_\_\_\_ (10 Points)

Distance AC = \_\_\_\_\_ (10 Points)

Page Total: \_\_\_\_\_ Points

TRIG-STAR PROBLEM 3 LOCAL CONTEST

REQUIRED ANSWER FORMAT  
 DISTANCES: NEAREST HUNDREDTH  
 AREAS: NEAREST WHOLE UNIT



**PROBLEM:**

THE NORTH SIDE OF PARCEL ABCD IS BOUNDED BY A LOCAL HIGHWAY. DUE TO A NEW HIGHWAY ALIGNMENT, THE NORTH SIDE OF PARCEL ABCD IS TO BE ROUNDED OUT WITH A CIRCULAR ARC AE. THE RADIUS OF THE ARC IS 500.00 AND IS TANGENT TO LINE AB AT POINT A. FIND THE NEW BOUNDARY DIMENSIONS OF PARCEL ~~ABCD~~, SUCH AS THE ARC LENGTH OF AE AND THE LENGTH OF LINE CE. ~~AECD~~

**KNOWN:**

AB = 300.00, BC = 412.31, CD = 200.00, DA = 400.00,  
 $\angle BCD = 104^{\circ}-02'-10''$ ,  $\angle CDA$  &  $\angle DAB = 90^{\circ}-00'-00''$ ,  
 & RADIUS OF ARC AE = 500.00

**FIND:**

- ARC LENGTH AE \_\_\_\_\_ (6 Points)      AREA ABCD \_\_\_\_\_ (6 Points)  
 LENGTH EC \_\_\_\_\_ (6 Points)      AREA AECD \_\_\_\_\_ (6 Points)  
 LENGTH BE \_\_\_\_\_ (6 Points)

Page Total: \_\_\_\_\_ Points

## TRIG--STAR ANSWER KEY

## LOCAL CONTEST

## PROBLEM 1-A

DISTANCE AC =

ANGLE ABC =

## PROBLEM 1-B

DISTANCE EH =

DISTANCE FH =

DISTANCE FG =

DISTANCE GH =

$\angle$  ABC =

## PROBLEM 2

DISTANCE AB =

DISTANCE AD =

DISTANCE AC =

## PROBLEM 3

LENGTH AE =

LENGTH EC =

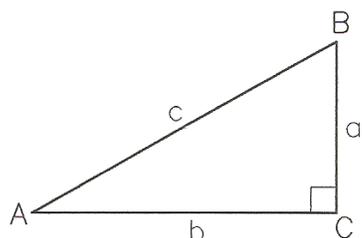
LENGTH BE =

AREA ABCD =

AREA AECD =

## TRIG-STAR MISCELLANEOUS DATA

### RIGHT TRIANGLE FORMULAS



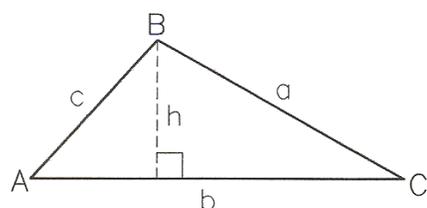
PYTHAGOREAN THEOREM:  $a^2 + b^2 = c^2$

AREA:  $\frac{1}{2}ab$

TRIGONOMETRIC FUNCTIONS:  $\sin A = \frac{a}{c}$ ,  $\cos A = \frac{b}{c}$ ,

$\tan A = \frac{a}{b}$

### OBLIQUE TRIANGLE FORMULAS

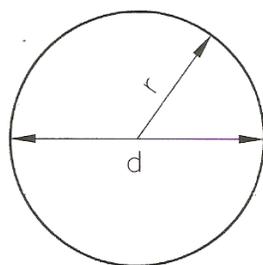


LAW OF SINES:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

LAW OF COSINES:  $a^2 = b^2 + c^2 - 2bc \cos A$

AREA:  $\frac{1}{2}bh$

### CIRCLE FORMULAS



DIAMETER =  $d$       RADIUS =  $r$

CIRCUMFERENCE:  $2\pi r$  or  $\pi d$

AREA:  $\pi r^2$

ONE DEGREE (1°) OF ARC = 60 MINUTES (60') OF ARC

ONE MINUTE (1') OF ARC = 60 SECONDS (60'') OF ARC

THEREFORE ONE DEGREE OF ARC (1°) = 3600 SECONDS OF ARC.